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ABSTRACT

This competency-based module uses the Ocean County (New Jersey) Vocational-Technical Schools curriculum-infused model for infusing basic skills instruction into vocational education. The model demonstrates the relationship of vocational skills to communication, mathematics, and science. The document begins with a philosophy statement; preface; a table that explains the number of hours required for academic credit in various programs and the number of those hours that are devoted to basic skills and vocational activities; matrices that show in which courses specific basic skills are taught; a list of objectives; and an explanation of student activities. Most pages in the document are tables that describe the relationship of vocational skills to basic skills within the industrial electronics and TV/computer repair program. These pages are organized by instructional unit and the topics within them. For each topic and associated task(s) are listed the theory and basic skills covered. Also listed are the expected student outcomes. The nine instructional units included are: orientation; safety; hand tools; structure of matter; basic electronics; digital electronics; test instruments; computers and PECs; and fluid power systems (hydraulics and pneumatics). (CML)

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# Competency Based Vocational Curricula

# COM-LINK

## With Basic Skills And Academic Linkages

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In Cooperation With The

**New Jersey State Department of Education**

**Division of Vocational Education**

**And**

**Ocean County Vocational-Technical School**

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# PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

## PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiences with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district are included. The totality of this package is designed to facilitate the vocational teaching process and to enchance the learning experiences of our students.

## POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

| COURSE | TOTAL HOURS | HOURS SPENT ON COMMUNICATION SKILLS | HOURS SPENT ON COMPUTATION SKILLS | HOURS SPENT ON SCIENCE | TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP |
|---|---|---|---|---|---|
| AIR CONDITIONING, REFRIGERATION AND HEATING | 900 | 140 | 120 | 120 | 520 |
| AUTO BODY REPAIR | 900 | 130 | 120 | 125 | 525 |
| AUTOMOTIVE MECHANICS | 900 | 150 | 120 | 120 | 510 |
| AUTOMOTIVE AND DIESEL ENGINE REBUILDING | 900 | 216 | 126 | 125 | 433 |
| BEAUTY CULTURE I AND II | 1000 | 240 | 120 | 130 | 515 |
| BUILDING TRADES | 900 | 135 | 120 | 130 | 515 |
| BUSINESS RELATIONS - MEDIA/MODELING | 450 | 200 | 60 | 40 | 150 |
| CHILD CARE AIDE | 900 | 240 | 120 | 122 | 418 |
| COMMERCIAL ART AND PRINTING | 900 | 120 | 215 | 75 | 580 |
| COMMERCIAL BUILDING CONSTRUCTION (MASONRY) | 900 | 130 | 125 | 130 | 515 |

## POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

| COURSE | TOTAL HOURS | HOURS SPENT ON COMMUNICATION SKILLS | HOURS SPENT ON COMPUTATION SKILLS | HOURS SPENT ON SCIENCE | TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP |
|---|---|---|---|---|---|
| COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION | 900 | 150 | 125 | 80 | 545 |
| CUSTOM CABINETMAKING | 900 | 130 | 120 | 60 | 590 |
| DENTAL ASSISTING | 450 | 168 | 65 | 77 | 140 |
| DESIGN DRAFTING | 900 | 135 | 150 | 165 | 450 |
| ELECTRICAL TRADES | 900 | 106 | 120 | 124 | 550 |
| FASHION MERCHANDISING | 450 | 200 | 60 | 40 | 150 |
| FOOD SERVICES | 900 | 206 | 132 | 125 | 437 |
| INDUSTRIAL AUTOMATION AND ELECTRONICS | 900 | 129 | 140 | 132 | 499 |
| INTERIOR DESIGN | 900 | 210 | 130 | 120 | 440 |
| LANDSCAPING AND GREENHOUSE TECHNOLOGY | 900 | 125 | 125 | 175 | 475 |

## POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

| COURSE | TOTAL HOURS | HOURS SPENT ON COMMUNICATION SKILLS | HOURS SPENT ON COMPUTATION SKILLS | HOURS SPENT ON SCIENCE | TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP |
|---|---|---|---|---|---|
| MARINE ENGINE AND BOAT SERVICES | 900 | 164 | 120 | 125 | 491 |
| MEDICAL OFFICE RECEPTIONIST/ASSISTANT | 450 | 173 | 60 | 77 | 140 |
| MEDICAL SKILLS AND RELATED HEALTH CAREERS | 450 | 135 | 65 | 125 | 125 |
| MEDICAL SKILLS (ADVANCED) | 450 | 125 | 60 | 125 | 140 |
| PLUMBING AND HEATING | 900 | 140 | 120 | 120 | 520 |
| RECREATIONAL VEHICLE MAINTENANCE AND REPAIR | 900 | 125 | 130 | 60 | 585 |
| T.V. AND COMPUTER REPAIR | 900 | 125 | 150 | 175 | 450 |
| WELDING | 900 | 135 | 120 | 100 | 545 |

## COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School.
The asterisk indicates that the topic is studied in that curriculum.

| COURSE | Functional Reading Skills | Vocabulary | Identifying Main Ideas | Meanings in Context | Inferences | Fact/Opinion Distinction | Signal Words | Parts of Text-book/Manual | Following Directions | Outlining and Note Taking | Interpretation of Maps, Graphs and Charts | Interpretation of Diagrams | Test Taking Skills | Expository Writing Skills | Problem Solving | Spelling | Oral Communications | Study Skills | Resume Writing | Job Application Skills |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AIR CONDITIONING, REFRIGERATION AND HEATING | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| AUTO BODY REPAIR | * | * | | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| AUTOMOTIVE MECHANICS | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| AUTOMOTIVE AND DIESEL ENGINE REBUILDING | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| BEAUTY CULTURE I AND II | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| BUILDING TRADES | * | * | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * |
| CHILD CARE AIDE | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| COMMERCIAL ART AND PRINTING CAREERS | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| COMMERCIAL BUILDING CONSTRUCTION (MASONRY) | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| CUSTOM CABINETMAKING | * | * | | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| DENTAL ASSISTING | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |

COMMUNICATION SKILLS - CONTINUED

| COURSE | Functional Reading Skills | Vocabulary | Identifying Main Ideas | Meanings in Context | Inferences | Fact/Opinion Distinction | Signal Words | Parts of Textbook/Manual | Following Directions | Outlining and Note Taking | Interpretation of Maps and Charts | Interpretation of Diagrams | Test Taking Skills | Expository Writing Skills | Problem Solving | Spelling | Oral Communications | Study Skills | Resume Writing | Job Application Skills |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN DRAFTING | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| ELECTRICAL TRADES | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| FASHION MERCHANDISING | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| FOOD SERVICES | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| INDUSTRIAL AUTOMATION AND ELECTRONICS | * | * | * | | * | * | | | * | * | * | * | * | * | * | * | * | * | * | * |
| INTERIOR DESIGN | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| LANDSCAPING AND GREENHOUSE TECHNOLOGY | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| MARINE ENGINE AND BOAT SERVICE | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| MEDICAL OFFICE RECEPTIONIST/ASSISTANT | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| MEDICAL SKILLS AND RELATED HEALTH CAREERS | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| MEDICAL SKILLS (ADVANCED) | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | * | * | * |
| PLUMBING AND HEATING | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| RECREATIONAL VEHICLE MAINTENANCE AND REPAIR | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| T.V. AND COMPUTER REPAIR | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| WELDING | * | * | * | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

## MATHEMATICS SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. The asterisk indicates that the topic is studied in that curriculum.

| COURSE | Whole Numbers | Common Fractions | Decimals | Percentages | Weights and Measurements | Ratio and Proportion | Powers and Roots | Formulas | Estimating | Geometry | Basic Trigonometric Functions | Graphs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AIR CONDITIONING, REFRIGERATION AND HEATING | * | * | * | * | * | * | * | * | * | * | * | * |
| AUTO BODY REPAIR | * | * | * | * | * | * | * | * | * | * | | * |
| AUTOMOTIVE MECHANICS | * | * | * | * | * | * | * | * | * | | | * |
| AUTOMOTIVE AND DIESEL ENGINE REBUILDING | * | * | * | * | * | * | * | * | * | * | | * |
| BEAUTY CULTURE I AND II | * | * | * | * | * | * | * | * | * | * | * | * |
| BUILDING TRADES | * | * | * | * | * | * | * | * | * | * | * | * |
| BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL | * | | * | * | | * | | | * | | | * |
| CHILD CARE AIDE | * | * | * | * | * | * | | * | * | * | * | * |
| COMMERCIAL ART AND PRINTING CAREERS | * | * | * | * | * | * | | * | * | * | | * |
| COMMERCIAL BUILDING CONSTRUCTION (MASONRY) | * | * | * | * | * | * | * | * | * | * | * | * |
| COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION | * | * | * | * | * | * | * | * | * | * | * | * |
| CUSTOM CABINETMAKING | * | * | * | * | * | * | * | * | * | * | * | * |
| DENTAL ASSISTING | * | * | * | * | * | * | | * | * | | | * |

MATHEMATICS SKILLS - CONTINUED

| COURSE | Whole Numbers | Common Fractions | Decimals | Percentages | Weights and Measurements | Ratio and Proportion | Powers and Roots | Formulas | Estimating | Geometry | Basic Trigonometric Functions | Graphs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN DRAFTING | * | * | * | * | * | * | | * | * | * | * | * |
| ELECTRICAL TRADES | * | * | * | * | * | * | * | * | * | * | * | * |
| FASHION MERCHANDISING | * | * | * | * | * | * | | * | * | * | | * |
| FOOD SERVICES | * | * | * | * | * | * | | * | * | * | | * |
| INDUSTRIAL AUTOMATION AND ELECTRONICS | * | * | * | * | * | * | | * | * | * | * | * |
| INTERIOR DESIGN | * | * | * | * | * | * | | * | * | * | | * |
| LANDSCAPING AND GREENHOUSE TECHNOLOGY | * | * | * | * | * | * | | * | * | * | * | * |
| MARINE ENGINE AND BOAT SERVICE | * | * | * | * | * | * | | * | | | * | * |
| MEDICAL OFFICE RECEPTIONIST/ASSISTANT | * | * | * | * | * | * | * | * | * | * | | * |
| MEDICAL SKILLS AND RELATED HEALTH CAREERS | * | * | * | * | * | * | | * | * | * | * | * |
| MEDICAL SKILLS (ADVANCED) | * | * | * | * | * | * | | * | * | * | * | * |
| PLUMBING AND HEATING | * | * | * | * | * | * | * | * | * | * | * | * |
| RECREATIONAL VEHICLE MAINTENANCE AND REPAIR | * | * | * | * | * | * | * | * | | | * | * |
| T.V. AND COMPUTER REPAIR | * | * | * | * | * | * | * | * | | * | * | * |
| WELDING | * | * | * | * | * | * | | * | * | * | * | * |

## SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits in your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

| | HUMAN ANATOMY | | | | | | ASTRONOMY | | | CHEMISTRY | | | PHYSICS | | | | | ECOLOGY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COURSE | Cellular Theory | Skeletal System | Muscles | System of Body | Diseases | Psychology | Solar System | Gravity | Weather | Matter | Chemical Reactions | Applied Chemistry | Light | Magnetism | Heat | Magnetism and Electricity | Nuclear Energy | Botany | Food Production | Fuels | Nutrition | Waste Disposal |
| AIR CONDITIONING, REFRIGERATION AND HEATING | | | | | | | * | * | * | * | * | * | | * | * | * | | | | * | * | |
| AUTO BODY REPAIR | | | | | | | | * | * | * | * | * | * | * | * | | | | | * | | * |
| AUTOMOTIVE MECHANICS | | | | | | | | * | | * | * | * | * | * | * | * | | | | * | | |
| AUTOMOTIVE DIESEL AND ENGINE REBUILDING | | | | | | | | * | | * | * | * | | * | * | * | * | | | * | | * |
| BEAUTY CULTURE I AND II | * | * | * | * | * | * | | | | * | * | * | * | | * | * | | | | | * | |
| BUILDING TRADES | | | | | | | * | * | * | * | * | * | * | | * | * | | * | | * | | |
| BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL | N | * O | * T | * A | V | * A | I | L | A | B | L | E | | | | | | | | | | |
| CHILD CARE AIDE | * | * | * | * | * | * | | | * | | * | * | | * | * | | | * | * | | * | * |
| COMMERCIAL ART AND PRINTING CAREERS | N | O | T | A | V | A | I | * L | A | * B | * L | * E | * | | * | * | | | | | | * |
| COMMERCIAL BUILDING CONSTRUCTION (MASONRY) | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | | * | | * | * | * |
| COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION | N | O | T | A | V | * A | I | * L | A | * B | * L | * E | * | | * | * | | | | | | * |
| CUSTOM CABINETMAKING | * N | O | T | A | V | A | I | * L | A | * B | * L | * E | | | * | | | * | | | | |
| DENTAL ASSISTING | * | * | * | * | * | * | | | | * | * | * | * | | | | | | | | * | * |

SCIENCE SKILLS - CONTINUED

| COURSE | HUMAN ANATOMY | | | | | | ASTRONOMY | | | CHEMISTRY | | | PHYSICS | | | | | ECOLOGY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cellular Theory | Skeletal System | Muscles | System of Body | Diseases | Psychology | Solar System | Gravity | Weather | Matter | Chemical Reactions | Applied Chemistry | Light | Magnetism | Heat | Magnetism and Electricity | Nuclear Energy | Botany | Food Production | Fuels | Nutrition | Waste Disposal |
| DESIGN DRAFTING | | | | | | | * | * | * | * | | * | * | | * | * | * | | | * | | * |
| ELECTRICAL TRADES | | | | | | | * | * | * | * | * | | * | * | * | * | * | | * | | | |
| FASHION MERCHANDISING | * | * | * | * | | * | | * | | * | * | * | * | | | | | | | | * | |
| FOOD SERVICES | | | | | * | * | | * | * | | * | * | * | | * | | | | * | | * | * |
| INDUSTRIAL AUTOMATION AND ELECTRONICS | | | | | | | | * | | * | | | * | * | * | * | * | | | * | | |
| INTERIOR DESIGN | | * | * | | | * | * | * | * | * | * | * | * | | * | * | | | | | | |
| LANDSCAPING AND GREENHOUSE TECHNOLOGY | | | | | | | * | * | * | | * | * | * | | * | * | | * | * | * | * | * |
| MARINE ENGINE AND BOAT SERVICE | | | | | | | | * | * | * | * | * | * | * | * | * | | * | | * | | |
| MEDICAL OFFICE RECEPTIONIST/ASSISTANT | N | * O | * T | * A | * V | * A | I | L | A | B | * L | E | | | | | | | | | | * |
| MEDICAL SKILLS AND RELATED HEALTH CAREERS | * | * | * | * | * | * | | * | | * | * | | | | | * | | | * | | * | * |
| MEDICAL SKILLS (ADVANCED) | * | * | * | * | * | * | | * | | * | * | | | | | * | | | * | | * | * |
| PLUMBING AND HEATING | | | | | * | | * | * | * | * | * | * | | | * | * | | * | | * | | * |
| RECREATIONAL VEHICLE MAINTENANCE AND REPAIR | N | O | T | A | V | A | I | * L | A | * B | * L | * E | * | * | * | * | | | | * | | * |
| T.V. AND COMPUTER REPAIR | | | | | | | | | | * | * | * | * | * | * | * | | | | * | | |
| WELDING | | | | | | | | * | | * | * | * | * | * | * | * | | | | * | | |

## COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in industrial electronics/T.V. computer repair.

2. To present 900 hours of instruction and practice in industrial electronics/ T.V. computer repair in accordance with the course curriculum and skill profile outline.

3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the industrial electronics and T.V. computer repair skill profiles.

4. To help each student develop positive attitudes and ideals related to their occupation in industrial electronics/T.V. computer repair and understand their own capabilities and potential.

5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

## STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as the basic tenets of democracy. Within the context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

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UNIT: ORIENTATION



TOPIC:

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. School rules and regulations | A. Student rights and responsibilities<br>B. Student grievance procedures<br>C. Student expectations<br>D. School code of discipline<br>E. Attendance and graduation policy<br>F. Student transfers<br>G. Grading system<br>H. Accidents<br>I. Bedside instruction<br>J. Cooperative Industrial Education (C.I.E.)<br>K. Driving policy<br>L. Drug and alcohol policy<br>M. Early dismissal procedures<br>N. Lockers<br>O. Driver permits<br>P. School closing procedures<br>Q. Smoking<br>R. Student progress reports<br>S. Telephones<br>T. Theft<br>U. Tools and equipment<br>V. Vocational Industrial Clubs of America (VICA) | A. Note taking<br>B. Filling out forms<br>C. Oral communication<br>D. Test taking skills<br>E. Functional reading skills (Student Handbook) | | | A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions<br>Written test<br>B. The student will know the standards to be met within the school and classroom<br>Written test |

**UNIT:** ORIENTATION - CONTINUED



**TOPIC:**

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| II. Student contract | A. Attendance<br>B. Request for make-up work<br>C. Extra help with assignments or lessons<br>D. Homework assignments<br>E. Requirements for each marking period (practical assignment sheet)<br>F. Notebooks, etc.<br>G. Sketch books<br>H. Field trips<br>I. Passing test grade<br>J. Daily grading system<br>K. Lockers<br>L. Daily cleaning duties | A. Note taking<br>B. Filling out forms<br>C. Oral communications<br>D. Test taking skills<br>E. Functional reading skills (Student Contract) | | | A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions<br>Written test<br>B. The student will know the standards to be met within the school and classroom<br>Written test |

**UNIT:** SAFETY

**TOPIC:** SHOP AND CLASSROOM

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Operate shop and classroom safely | A. Effects of electrical shock on the human body<br>B. Ground currents<br>C. Fault currents<br>D. Proper use of tools and equipment in shop and classroom | A. Functional reading skills - information sheet<br>1. Electrical shop safety<br>2. Fire shop safety<br>3. General shop safety<br>B. Note taking skills<br>1. Lecture<br>2. Demonstration | | A. Reaction of human body to electric shock<br>B. Resistance changes of body<br>C. Causes of body changes | A. The student will be able to pass a written test on shop and classroom safety<br>B. The student will be able to recognize and report safety hazards in the shop and classroom<br>C. The student will be able to adhere to all safety rules and regulations<br>D. The student will be able to demonstrate proper evacuation route in case of fire |

UNIT: HAND TOOLS

TOPIC: CARE AND USE



| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Select and use proper hand tool for the job to be done | A. Identification of hand tools by technical name and trade name<br>B. Criteria for selecting proper tool<br>C. How to care for each particular hand tool | A. Functional reading skills<br>B. Note taking skills<br>C. Identification of tools by picture and diagram | Reading a ruler | | A. The student will be able to call tools by correct name<br>B. The student will be able to demonstrate the proper way to care for soldering tools<br>C. The student will be able to demonstrate proper selection of screwdrivers<br>D. The student will be able to demonstrate care of all other hand tools<br>E. The student will be able to demonstrate methods used to recognize bad and dangerous tools<br>F. The student will be able to pass a written test on tool identification |

**UNIT:** STRUCTURE OF MATTER

**TOPIC:**

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| | A. What is matter<br>B. What makes a conductor<br>C. What makes an insulator | A. Functional reading skills<br>B. Note taking skills<br>C. Oral communications | | A. Element - atom<br>1. Proton<br>2. Electron<br>3. Neutron<br>B. Ion<br>C. Compound<br>D. Molecule<br>E. Free electron<br>F. Charge<br>G. Law of charges<br>H. Electron orbits<br>I. Conductors<br>J. Insulators | A. The student will be able to pass a written test on the structure of matter<br>B. The student will be able to state the law of charges<br>C. The student will be able to define<br>1. Free electron<br>2. Ion<br>3. Conductor<br>4. Insulator |

**UNIT:** BASIC ELECTRONICS



**TOPIC:** D.C. FUNDAMENTALS - OHMS LAW

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Functions of Ohms Law | A. Three parts of a circuit<br>B. Three basic circuit components<br>C. Quantitive parts of the circuit<br>D. Current flow direction<br>1. Conventional<br>2. Electron flow<br>E. Relationship of quantitive circuit parts<br>F. Current rule<br>G. Voltage rule<br>H. Series circuits<br>I. Parallel circuits<br>J. Series parallel circuit<br>K. Kirchoff's Law<br>L. Electrical horsepower<br>M. Electrical power<br>N. What is a short circuit<br>O. What is an open circuit<br>P. Voltage drop | A. Functional reading skills<br>B. Note taking skills<br>C. Oral communications<br>D. Question asking<br>E. Drawing diagrams | A. Addition<br>B. Subtraction<br>C. Multiplication<br>D. Division<br>E. Basic algebra solving for unknown numbers<br>F. Using formulas | A. Definition of direct current<br>B. Heat produced by current through resistance<br>C. Energy conversion | A. The student will be able to calculate for unknown values of E,I,R using Ohms Law<br>B. The student will be able to apply Kirchoffs Law to solve for unknown values of E,I,R<br>C. The student will be able to define<br>1. Coulomb<br>2. Ampere<br>3. Open circuits<br>4. Short circuits<br>5. Voltage drop<br>D. The student will be able to calculate for unknown values of power using Ohms Law |

**UNIT:** BASIC ELECTRONICS - CONTINUED

**TOPIC:** SOLDERING

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Proper soldering of electrical and electronic equipment | A. Terminology<br>B. Soldering tools<br>C. Cleaning connections<br>D. Stripping and tinning of wire<br>E. Soldering procedure<br>F. Poor solder connections<br>G. Good solder connections<br>H. Mechanical connection<br>I. Desoldering techniques | A. Functional reading skills<br>B. Note taking skills<br>C. Oral communications | | A. How solder flows and sticks - capillary action<br>B. Flux<br>1. Purpose<br>2. Action on solder connection<br>C. Solder make-up | A. The student will be able to select proper soldering tools<br>B. The student will be able to make proper solder connections<br>C. The student will be able to care for tools properly<br>D. The student will be able to desolder and remove parts correctly |

**UNIT:** BASIC ELECTRONICS - CONTINUED



**TOPIC:** SOURCES OF ELECTRICAL ENERGY

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Production of electric energy | A. Chemical action<br>1. Batteries<br>2. Types of batteries<br>3. Rating<br>B. Magnetism<br>1. Generator<br>2. Alternator<br>C. Light - solar cell<br>D. Heat<br>1. Thermo pile<br>2. Thermo couple<br>3. Constantine wire<br>E. Pressure - piezo electric<br>F. Friction<br>1. Cloth and wax<br>2. Lighting<br>G. Electrolyte<br>H. Hydrometer | A. Functional reading skills<br>B. Note taking skills<br>C. Oral communications<br>D. Interpret data | | A. Electrolyte action<br>B. Crystal effect<br>C. Photo electric effect<br>D. Dissimilar metals | A. The student will be able to pass a written test on source of electricity<br>B. The student will be able to test batteries to determine condition<br>C. The student will be able to explain generation<br>D. The student will be able to explain piezo electric effect<br>E. The student will be able to describe how friction produces electricity |

**UNIT:** BASIC ELECTRONICS - CONTINUED

**TOPIC:** A.C. FUNDAMENTALS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. The sine wave | A. What is a sine wave<br>B. What is frequency<br>C. Wave period<br>D. Instantaneous value<br>E. Average value<br>F. Effective value<br>G. How generated<br>H. How sine wave is produced<br>I. Wave length<br>J. Units of time | A. Functional reading skills<br>B. Note taking skills<br>C. Diagraming wave forms<br>D. Oral communications | A. Basic algebra<br>B. Addition<br>C. Subtraction<br>D. Multiplication<br>E. Division<br>F. Conversions<br>1. Milli<br>2. Micro<br>3. Nano<br>4. Kilo<br>5. Mega<br>6. Giga | A. Effects of A.C. on conductors<br>B. Lens Law | A. The student will be able to calculate for values of an A.C. wave<br>B. The student will be able to calculate time period of an A.C. wave<br>C. The student will be able to calculate frequency of an A.C. wave<br>D. The student will be able to calculate wave length of an A.C. wave<br>E. The student will be able to convert units of time and frequency |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Use Ohms law to solve for unknown values of volts, amps and ohms in an A.C. circuit | A. A.C. circuits with resistance<br>1. Series<br>2. Parallel<br>3. Series parallel<br>B. A.C. circuits with resistance and reactance (X)<br>C. Inductive reactance (XL)<br>D. Capacitive reactance (XL)<br>E. Phase angle in capacitive circuits<br>F. Phase angle in inductive circuit<br>G. Nonsinusoidal wave forms<br>1. Triangular<br>2. Square<br>3. Saw tooth<br>4. Pulse<br>H. Impedance (Z)<br>I. Harmonics | A. Functional reading skills<br>B. Note taking skills<br>C. Diagraming circuits<br>D. Oral communications<br>E. Calculations | A. Basic algebra<br>B. Addition<br>C. Subtraction<br>D. Division<br>E. Multiplication<br>F. Basic trigonometry<br>G. Square roots<br>H. Square of numbers<br>I. Formulas | Radians used<br>1. Electricity<br>2. Electrons | A. The student will be able to calculate for unknown values of voltage, current and ohms in an A.C. circuit<br>B. The student will be able to calculate for unknown value of reactance in an A.C. circuit<br>C. The student will be able to calculate for unknown values of impedance in an A.C. circuit<br>D. The student will be able to define a radian |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| | A. Types of resistors<br>1. Fixed<br>2. Adjustable<br>3. Variable<br>4. Tapped<br>5. Circuit symbol<br>6. Color code<br>7. Cermet<br>8. Fusible<br>9. Non linear<br>B. Circuit symbols<br>C. Potentiometers<br>D. Rehostats<br>E. Power rating<br>F. Selecting resistors<br>G. Resistor troubles<br>H. Four band resistor<br>I. Five band resistor | A. Functional reading skills<br>B. Note taking skills<br>C. Color recognition<br>D. Oral communications<br>E. Drawing<br>F. Diagraming | Conversion of numbers<br>1. Kilo<br>2. Mega | A. Composition of resistors<br>1. Carbon<br>2. Wire wound<br>3. Film deposit<br>4. Resistive paint<br>B. Physical make-up determines resistance not physical size | A. The student will be able to determine resistance value of resistor using color code<br>B. The student will be able to select proper resistor by value type and power rating<br>C. The student will be able to measure resistance using ohmmeter |

**UNIT:** BASIC ELECTRONICS - CONTINUED

**TOPIC:** VOLT, OHM AND MILLIAMMETER (VOM)

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Measure volts, ohms and amperes<br><br>II. Construct and test VOM kit | A. Read voltmeter scales<br>B. Read ammeter scales<br>C. Read ohmmeter scales<br>D. Type of meter movement used in VOM<br>E. Multiplier resistors<br>F. Shunt resistors<br>G. Construct VOM kit | A. Functional reading skills<br>B. Note taking skills<br>C. Following assignment sheet<br>D. Oral communications<br>E. Read meter scales and interpret data | A. Interpolate<br>B. Number conversion<br>C. Basic algebra<br>D. Use formulas | Operation of D'arsonval meter movement | A. The student will be able to use VOM to measure unknown values of volts, ohms and amperes<br>B. The student will be able to describe function of meter movement<br>C. The student will be able to use proper soldering techniques<br>D. The student will be able to assemble, test and use VOM kit<br>E. The student will be able to demonstrate proper selection and use of hand tools |

**UNIT:** BASIC ELECTRONICS - CONTINUED



**TOPIC:** SEMICONDUCTOR DIODES

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. How diodes are used | A. The PN junction<br>B. Bias<br>1. Forward<br>2. Reverse<br>C. Types of diodes<br>1. Rectifier<br>2. Signal<br>D. Diode materials<br>1. Silicon<br>2. Germanium<br>E. Forward voltage drop<br>1. Silicon<br>2. Germanium<br>F. Forward current<br>G. PIV<br>F. PRV<br>H. Packaging<br>1. Type<br>2. Styles<br>I. Testing<br>J. Use cross reference guides | A. Functional reading skills<br>B. Note taking skills<br>C. Interpret data and specification sheets<br>D. Oral communications<br>E. Making graphs | | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to describe function of PN junction<br>B. The student will be able to use ohmmeter to test diodes for opens, shorts or leakage<br>C. The student will be able to pass a written test on diode operation<br>D. The student will be able to plot graph on forward current in silicon and germanium diode |

**UNIT:** BASIC ELECTRONICS - CONTINUED

**TOPIC:** TRANSISTORS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. How transistors operate | A. Types of transistors<br>1. NPN<br>2. PNP<br>3. FET<br>B. Classes of operation<br>1. A<br>2. B<br>3. $A_1$<br>4. $A_2$<br>5. C<br>6. G<br>C. Terminology<br>1. $I_b$<br>2. $I_c$<br>3. $E_c$<br>4. $E_b$<br>D. Use data sheet and cross reference<br>E. Test and evaluate transistors<br>F. Biasing<br>1. Forward<br>2. Reverse | A. Note taking skills<br>B. Problem solving<br>C. Functional reading skills<br>D. Interpretation of data and cross reference guides | Calculations | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to describe the operation of a transistor<br>B. The student will be able to identify classes of operation<br>C. The student will be able to test for shorts, opens and leakage<br>D. The student will be able to describe various terminology<br>E. The student will be able to use data sheet and cross reference catalog<br>F. The student will be able to remove and replace as required to repair equipment<br>G. The student will be able to construct and test various types of amplifiers<br>H. The student will be able to calculate stage gains |

**UNIT:** BASIC ELECTRONICS - CONTINUED

**TOPIC:** POWER SUPPLIES

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| 1. Test, analyze and repair electronic derived D.C. power supplies | Types of D.C. power supplies<br>1. Half wave<br>2. Full wave<br>3. Full wave bridge<br>4. Voltage doubler<br>5. Regulated<br>a. shunt<br>b. series | A. Note taking skills<br>B. Functional reading skills<br>C. Interpretation of diagrams<br>D. Oral communications | A. Addition<br>B. Subtraction<br>C. Division<br>D. Multiplication<br>E. Basic algebra<br>F. Calculations | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to construct and analyze various types of power supplies<br>B. The student will be able to calculate percentage of regulation<br>C. The student will be able to repair and service power supplies<br>D. The student will be able to select appropriate test instruments<br>E. The student will be able to use part and cross reference catalogs<br>F. The student will be able to select and use proper tools and equipment for maintenance and repair |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Logic gates | A. Types of gates<br>1. AND<br>2. OR<br>3. NAND<br>4. NOR<br>5. NOT<br>6. Buffer<br>7. X OR<br>B. Truth tables for gates<br>C. Boolean expression of truth tables<br>D. Schematic symbol for gates | A. Note taking skills<br>B. Functional reading skills<br>C. Oral communications<br>D. Written expression of truth tables for gates | Boolean algebra | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to write truth tables for gates<br>B. The student will be able to express in written form Boolean formula for truth tables<br>C. The student will be able to draw symbols for various gates |

**UNIT:** DIGITAL ELECTRONICS - CONTINUED

**TOPIC:** NUMBER SYSTEMS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Number systems used in digital electronics | A. Basic number systems<br>1. Decimal (base 10)<br>2. Binary (base 2)<br>3. Octal (base 8)<br>4. Hexidecimal (base 16)<br>B. How number systems are used<br>C. Where numbers systems are used | A. Note taking skills<br>B. Oral communications<br>C. Functional reading skills | A. Basic algebra<br>B. Conversion from number system to number system<br>C. Addition of binary numbers<br>D. Subtraction of binary numbers | | A. The student will be able to convert one number system to different number system<br>B. The student will be able to add and subtract binary numbers<br>C. The student will be able to express decimal numbers in digital format |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Application of flip-flops, adders and registers | A. Operation of flip-flop<br>1. Set reset<br>2. Clocked set reset<br>3. D flip-flop<br>4. J-K flip-flop<br>B. Registers - shift register<br>C. Adders<br>1. Half adder<br>2. Full adder | A. Note taking skills<br>B. Oral communications<br>C. Interpretation of logic diagrams | | | A. The student will be able to trace logic signals through a logic circuit<br>B. The student will be able to describe the operation of flip-flops<br>C. The student will be able to describe the operation of adders<br>D. The student will be able to describe the operation of registers<br>E. The student will be able to construct various logic functions using adders, flip-flops and registers |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| 1. Application of decoders, counters and multiplexers | A. BCD decoders<br>B. Counters<br>C. Multiplexers<br>D. Display decoders<br>1. LED type<br>2. LCD type | A. Note taking skills<br>B. Oral communications<br>C. Interpretation of logic circuit diagrams<br>D. Test taking skills | Conversion from binary to decimal number systems | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to describe the operation of BCD decoder<br>B. The student will be able to describe the operation of a counter<br>C. The student will be able to describe the operation of multiplexers<br>D. The student will be able to describe the oepration of display decoders<br>E. The student will be able to construct and test various counting and display digital circuits<br>F. The student will be able to trace and record digital data using logic probes and logic pulsers |

**UNIT:** TEST INSTRUMENTS

**TOPIC:** OSCILLOSCOPE

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Use of oscilloscope | A. Voltage measurement - peak to peak<br>B. Frequency measurement<br>1. Hertz<br>2. 1/Time<br>C. Time measurement<br>1. Milli seconds<br>2. Micro seconds<br>3. 1/Frequency<br>D. Wave form<br>1. Analyze<br>2. Comparison<br>E. Troubleshooting<br>1. Electronic circuits<br>2. Digital circuits | A. Note taking skills<br>B. Oral communications<br>C. Visual observation<br>D. Test taking skills<br>E. Interpretation of diagrams<br>F. Wave form drawing<br>G. Functional reading skills | A. Basic algebra<br>B. Conversion from whole numbers to decimal values<br>C. Conversion from decimal to whole numbers | | A. The student will be able to measure and record values of voltage<br>B. The student will be able to measure and record values of time<br>C. The student will be able to measure and record values of frequency<br>D. The student will be able to compare and analyze composite wave forms<br>E. The student will be able to calculate for values of frequency and time<br>F. The student will be able to calculate for values of average and effective voltage |

UNIT: TEST INSTRUMENTS - CONTINUED

TOPIC: VOM AND DMM METERS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Utilize the VOM for testing and measuring circuit values<br><br>II. Utilize the DMM for testing and measuring circuit values<br><br>III. Interpret and use data | A. Operation of VOM<br>B. Operation of DMM<br>C. How to read VOM scale<br>D. How to read DMM scale<br>E. When to use VOM<br>F. When to use DMM | A. Note taking skills<br>B. Oral communications<br>C. Interpretation of diagrams<br>D. Functional reading skills<br>1. Data sheets<br>2. Specs<br>E. Problem solving - use data from meters to solve circuit problems | A. Basic math<br>B. Basic algebra<br>C. Conversion from decimal to whole numbers<br>D. Conversion from whole numbers to decimal | A. Magnetism<br>B. Heat exchange through resistance | A. The student will be able to use VOM and DMM to measure data<br>B. The student will be able to use data measured for circiut analysis<br>C. The student will be able to properly use and care for VOM and DMM<br>D. The student will be able to repair and calibrate electrical and electronic equipment using VOM and DMM |

**UNIT:** COMPUTERS AND PEC'S

**TOPIC:** C.P.U.

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Describe the operation of C.P.U.<br><br>II. Name main areas in C.P.U. | A. Block diagram of typical C.P.U.<br>1. 6502<br>2. 6800<br>B. What C.P.U. does<br>C. Main area of C.P.U.<br>1. Registers<br>2. Arithmetic logic unit (ALU)<br>3. Stack painter<br>D. Instructions for C.P.U.<br>E. Terminology used | A. Note taking skills<br>B. Functional reading skills<br>C. Oral communications<br>D. Interpretation of diagrams | A. Conversion from one number system to another number system<br>B. Basic math<br>C. Basic algebra | A. Operation of PN junction<br>B. Doping of semiconductors | A. The student will be able to describe the main function of C.P.U.<br>B. The student will be able to draw a block diagram and label each component or area<br>C. The student will be able to describe the function of each component or area<br>D. The student will be able to use terminology as applied to C.P.U. |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Types of memory in computer<br>A. ROM<br>B. RAM<br><br>II. Where used in computer | A. ROM (Read only memory) - types<br>1. PROM<br>2. EPROM<br>3. EEPROM<br>B. RAM (Random access memory) - generic name; read/write memory<br>C. Uses for each type of memory | A. Note taking skills<br>B. Functional reading skills<br>C. Oral communications<br>D. Interpretation of diagrams | A. Basic math<br>B. Basic algebra<br>C. Numbers conversion | | A. The student will be able to define ROM<br>B. The student will be able to define RAM<br>C. The student will be able to describe the purpose and uses of memory types<br>D. The student will be able to construct and test each type of memory section using trainers and components<br>E. The student will be able to follow memory signal and information using meters and logic probes |

**UNIT:** COMPUTERS AND PEC'S - CONTINUED

**TOPIC:** I/O PORTS AND PERIPHEALS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. What is I/O ports<br><br>II. What is peripheal<br><br>III. Why ports are used<br><br>IV. What is interface | A. Describe I/O ports<br>B. Types of ports<br>1. Serial<br>2. Parallel<br>C. Define parallel<br>D. Types of peripheals<br>1. Printer<br>2. Modem<br>3. Keyboard<br>4. Monitor<br>5. Others<br>E. Interfaces<br>1. RS 232<br>2. Opto coupler<br>3. Purpose | A. Note taking skills<br>B. Oral communications<br>C. Functional reading skills<br>D. Interpretation of diagrams<br>E. Vocabulary | | A. Light transfer<br>B. Light sensitive material<br>C. Effects of light on certain semiconductors | A. The student will be able to identify and define the terms I/O, peripheal, serial port and parallel port<br>B. The student will be able to describe the function of I/O port<br>C. The student will be able to identify ports on computers and PEC's<br>D. The student will be able to describe the purpose of interface<br>E. The student will be able to describe the function of opto coupler type interface<br>F. The student will be able to assembles and tests opto coupler using trainers and test instruments |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Test and repair basic computers and PEC's | Techniques and procedure used to diagnose and repair malfunctions in computers and PEC's<br>1. Visual inspection<br>2. Operations check<br>3. Sensory check<br>a. feel (heat)<br>b. smell<br>4. Sequential test using proper test equipment<br>a. sectionalize<br>b. regionalize<br>c. localize<br>5. Gather information from user - ask questions<br>6. Use parts and cross reference catalogs for parts<br>7. Make use of diagrams | A. Note taking skills<br>B. Oral communications<br>C. Interpretation of diagrams<br>D. Instrument reading interpretation<br>1. Scope<br>2. VOM<br>3. DMM<br>4. Transistor and diode checker | A. Basic math<br>B. Basic algebra<br>C. Number conversion | A. Operation of PN junction<br>B. Doping of semiconductors<br>C. Heat effects on semi-conductors<br>D. Temperature sensing devices<br>E. Pressure sensing devices | A. The student will be able to select the proper method for troubleshooting, testing and repair of computers and PEC's<br>B. The student will be able to gather data and make diagnosis of problem<br>C. The student will be able to select the proper test equipment as needed to make repair and return to service<br>D. The student will be able to select and use the appropriate tools<br>E. The student will be able to select and use the appropriate diagrams and parts list |

**UNIT:** FLUID POWER SYSTEMS (HYDRAULICS AND PNEUMATICS)

**TOPIC:** VALVES

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. What are three types of valves used in fluid power<br><br>II. Identify and draw symbol for each type<br><br>III. Define the purpose of each type of valve<br><br>IV. How valves are classified<br><br>V. Detect and replace valves that are malfunctioning<br><br>VI. Describe how valves are controlled and operated | A. Name three types of valves used in fluid power<br>1. Direction control<br>2. Pressure control<br>3. Flow control<br>B. Show symbol as it appears in diagrams<br>C. State purpose and use of each valve<br>D. Show how valves are classified<br>E. How to diagnose malfunctioning valves<br>F. Malfunctions<br>1. Mechanical<br>2. Electrical<br>3. Leakage<br>G. How valves are controlled and operated<br>H. Safe and proper use of test equipment | A. Note taking skills<br>B. Oral communications<br>C. Interpretation of diagrams | A. Basic math<br>B. Basic algebra<br>C. Conversion of numbers | A. Force transmission through fluid<br>B. Heat generation due to circulation of fluid<br>C. Heat generation through compression of fluid<br>D. Magnetism | A. The student will be able to identify and describe three types of control valves<br>B. The student will be able to draw symbol and explain<br>C. The student will be able to classify various valves by symbol<br>D. The student will be able to define the purpose and use of each type of valve<br>E. The student will be able to test valves for malfunctions<br>F. The student will be able to replace valves that malfunction<br>G. The student will be able to identify and state various types of malfunctions<br>H. The student will be able to demonstrate and explain methods of control and operation of valves |

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Explain the operation and use of various types of pumps and compressors | A. Basic pump operation<br>B. Basic compressor operation<br>C. Types of pumps<br>1. Vane<br>2. Piston<br>3. Variable displacement<br>4. Others<br>D. Types of compressors<br>1. Single stage<br>2. Multiple stage<br>E. Pump and compressor drives<br>1. Electric motor<br>2. Gasoline engine<br>3. Others<br>F. Pump and compressor malfunctions<br>1. Cavitation<br>2. Overheat<br>3. Mechanical wear<br>4. Corrosion | A. Note taking skills<br>B. Functional reading skills<br>C. Oral communications<br>D. Expository writing skills - written reports | A. Basic math<br>B. Basic algebra | A. Operation of a pump at the input side<br>B. Heat generation in a pump - why and how<br>C. Compressor heat generation<br>D. Compression<br>1. Gas<br>2. Liquid<br>E. Force transmission through a fluid<br>1. Pascal's law<br>2. Bournelli's law<br>F. Negative pressure<br>G. Positive pressure<br>H. Siphon action<br>I. Precipitation action in compressed gases | A. The student will be able to describe the basic operation of a pump<br>B. The student will be able to describe the basic oepration of a compressor<br>C. The student will be able to describe the operation of multiple stage compressor<br>D. The student will be able to describe the operation of vane pump<br>E. The student will be able to describe the operation of piston pump<br>F. The student will be able to describe the operation of variable displacement pump<br>G. The student will be able to describe cavitation<br>H. The student will be able to identify pumps and compressor malfunctions<br>I. The student will be able to replace pumps and compressors that malfunction |

TOPIC: ACTUATORS

| Task | Theory | Communication Skills | Mathematics Skills | Science Knowledge | Student Outcome |
|---|---|---|---|---|---|
| I. Name various fluid power actuators<br><br>II. Describe the operation of fluid power actuators<br><br>III. Detect and replace actuators that are malfunctioning | A. Fluid power actuators<br>1. Cylinder<br>2. Motor<br>3. Servo<br>B. Describe operation of<br>1. Cylinder<br>a. single acting<br>b. double acting<br>2. Motors<br>a. unidirection<br>b. reversible<br>3. Servos<br>C. Malfunctions<br>1. Leakage<br>2. Mechanical<br>3. Corrosive<br>D. Replacement<br>1. When<br>2. Safety precautions | A. Note taking skills<br>B. Oral communications<br>C. Functional reading skills<br>D. Following directions | A. Basic math<br>B. Basic algebra | A. Force transmission in a fluid<br>B. PSIA (what)<br>C. PSIG (what)<br>D. Relationship to PSIG and the atmospheric pressure | A. The student will be able to name three types of fluid power actuators<br>B. The student will be able to describe the function of each types of actuator<br>C. The student will be able to describe and explain various types of actuator malfunctions and the causes of these malfunctions<br>D. The student will be able to describe when and how to replace actuators |